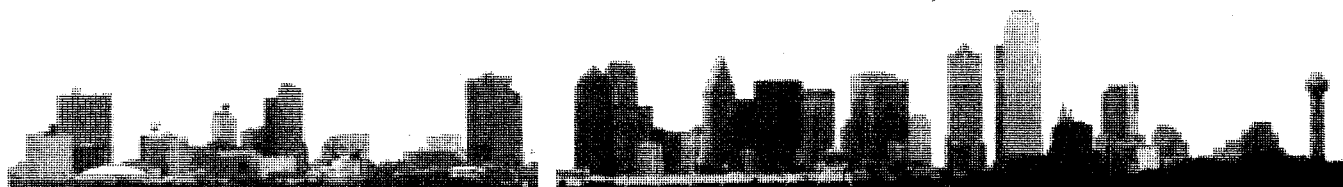


MCCC NEWS

Metroplex Commodore Computer Club



Fort Worth

Volume 9 Issue 2 – February 1991

Dallas

The HP DeskJet 500

Some good news and some bad news

by Bill Raecke

At the MCCC Board of Directors' meeting last month, the Board approved the purchase of a new Hewlett Packard DeskJet 500 for the use of the newsletter editor to replace the Hewlett Packard DeskJet which has been in use for the last two years. The idea was to reduce the time that it takes to actually print the master that is used by our print shop and thus free up more of the editor's (my) valuable time. What you are now reading was produced on this new printer. What I expected was a 10 to 20 percent increase in speed with no loss in quality. What I got was something entirely different. And, unfortunately, there is some good news and some bad news.

Let's take the good news first. The good news is the printer's speed. As I mentioned before, I expected a 10 to 20 percent increase in speed. To determine the actual speed increases, I ran several tests with the HP DeskJet before it was sold. I then ran the identical files to the new HP DeskJet 500 for comparison. The first test was of a multiple-page standard text file using the default Courier font in both letter quality and draft mode. The second test was of a 1 1/2 page *Word Perfect* document printed using a downloaded, proportional font in letter quality mode. The third was a screen dump of the picture "Rosecliff" that appeared on the chapter pages in last month's newsletter printed as a full page in letter quality mode. Let's look at the numbers.

Multi-page document using standard draft text:

DeskJet: 2 min 40 sec DeskJet 500: 2 min 10 sec

Multi-page document using standard letter quality text:

DeskJet 3 min 30 sec DeskJet 500: 2 min 20 sec

Word Perfect document using a proportional font:

DeskJet: 2 min 20 sec DeskJet 500: 1 min 20 sec

Full page graphic dump:

DeskJet: 7 min 30 sec DeskJet 500: 1 min 35 sec

No, that's not a misprint. A full page of graphics has been sped up, not by 10 or 20 percent, but by just under 500 percent. Since this newsletter is all graphics, that is good news. Most of that speedup is due to the fact that the printer firmware that controls the printhead prints four times a much of the picture with every pass of the printhead and controls horizontal movement of the printhead much better (with less wasted movement). The rest of the speedup is due to a faster paper-feed mechanism. Whatever the reason, it means that yours truly, using this new printer, can run off the final copy of a newsletter in less than an hour instead of consuming an entire afternoon. (There is some calculation time involved before the printer springs into action that extends the total time required.)

That brings us to the bad news. I wasn't expecting any bad news and I'm rather disappointed that I have to report it. That fact is that the new DeskJet 500 produces output that is not as crisp as that of the original DeskJet. This is only apparent when printing graphics and only then when printing grey scales – black and white (as in text) looks fine. I have run a couple of hundred tests and used up an entire ink cartridge trying to determine why this is the case. What I found is that there are two reasons for the apparent reduction of quality.

The first is the new paper-feed mechanism. As near as I can determine, Hewlett Packard decided to trade speed for quality. While the new mechanism is extremely fast, it does not seem to be as accurate in positioning the paper for the next pass of the printhead. What you see are either small gaps or small overlaps that occur at random positions in the document. I need to emphasize that these are extremely minor variations. Remember



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PageStream 2.1

Another major upgrade from Soft-Logik
by Bill Raecke

It's only been a couple of months since my last review of *PageStream*. Version 2.0 was released late last year and a review appeared in the October issue of the MCCC News. Since I produce this newsletter using *PageStream* and since I am convinced that there is no better desktop publishing software available for the Amiga, everyone will have to put up with my periodic reviews when upgrades are issued. But this time around, since the last review was so recent, this will not be a full review. Instead, I will just cover some of the major enhancements and fixes since the last release.

Before I get into all that, however, I need to tell

New features include better color support and the ability to import and modify structured clipart from Professional Draw.

everyone how this upgrade arrived. As with most *PageStream* upgrades (*PageStream 2.0* excepted), it arrived in the mail three days ago. There is no charge, no card to send back, nothing. Just a free upgrade without asking. This is customer support the way it ought to be. The only charge this time around is for a new, completely re-written manual. The software is perfectly usable with the old manual, but the new manual (two volumes and a quick reference card) promises to be easier to read and more complete. It is \$25 to all registered owners who want it.

One of the major advantages that *Professional Page* has offered over *PageStream* is better color support. (Since this newsletter is completely black and white, this hasn't mattered a great deal to me, but it is a major drawback for anyone working professionally.) Panatone is considered the standard color matching process in the industry. *PageStream 2.1* now supports the CMYK color model. (The CMYK model is a method which defines colors in terms of their Cyan, Magenta, Yellow, and Black components.) By purchasing a Panatone process color selector from Panatone, Inc., colors can be defined with their CMYK equivalents.

The other major enhancement in *PageStream 2.1* is the addition of more graphic import modules. The most important of these (right now) is the *ProDraw* module. This allows the importing of structured clipart from *Professional Page's* companion product, *Professional Draw*. (Structured clipart, for those who may not know, is

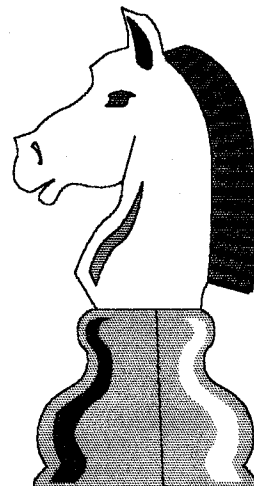
artwork which consists of mathematically defined lines or vectors rather than a series of dots as in bit-mapped clipart. This results in a much higher quality of output since it eliminates "jaggies". See the companion clip for an example.) The most interesting thing about the implementation of this feature into *PageStream* is the fact that, once imported, the clipart can still be modified from within *PageStream*. This is a trick that not even *Professional Page* has been able to master even though *ProPage* and *ProDraw* are companion products. Also added are a GIF import module and a DR2D import module. GIF is the graphic standard created by CompuServe for bit-mapped images. DR2D is the new Commodore vector graphic standard which we will be seeing a lot more of in the future.

Under the heading of small improvements are such things as a new on-screen toolbox. The functions remain the same as before, but the display has been cleaned up so as to be more friendly. The screen rendering times for fonts has also been improved by a small degree.

There have also been a series of bug fixes. The most important of these in my opinion has to do with text flow. With all previous versions of *PageStream*, if there were linked blocks of text in a document, and if the text formatting controls were set to automatically indent the beginnings of paragraphs, and if the beginning of a paragraph fell on the first line of a block which had text flowing into it, the paragraph would not indent. That's been bugging me for a long time. It's fixed now.

Soft-Logik spokesperson Stephanie Manning has stated that "version 2.1 would make other Amiga desktop publishing programs obsolete." That may be an overstatement. Actually, I think the high level of competition in the desktop publishing arena is improving all the available products and I hope that it continues. I do think it is fair to say, however, that this latest release of *PageStream* moves it firmly to the top of the heap.

And to heat up the competition even further - coming soon from Soft-Logik: a new structured drawing program to go head to head with *ProDraw*.



A New Beginning

The start of a new C64/C128 series
by Foster McCowan

This issue begins something that this author hopes will be an oft repeated event: An article for Commodore 64 and 128 users will appear in these very pages! Actually, for attention-starved Commodore 8-bit computer owners, this section hopefully will focus on the many positive aspects of owning Commodore 64/128 computers. Since we will be concentrating on the growth aspects of Commodore 8-bit computers, our major emphasis will be on the plethora of new hardware that's being produced, the GEOS operating system, the excellent software being developed for the Commodore 128, and games. To this end, contributions from all would-be writers, accomplished programmers, expert gamers, or more importantly, readers of this newsletter, would be appreciated. You may upload the contribution on the MCCC BBS, leave E-MAIL to me, or call me at home. This issue going forward affords us the opportunity to reorient our interests toward learning and developing new multifaceted uses for our computers and to share that experience with others. There is no better vehicle for accomplishing those goals than with our participation.

A Brief History

Let's go way, way back for a moment. The Commodore 64 was developed in the early eighties for a home market when there was no home market. It included a 40-column screen because it was designed for its users to be able to use a television for its screen output. One thing they didn't consider is that a 40-column screen is horrible for word processing. Add to that a one megahertz clock, the slowest disk drive in the business, and a 64K memory and you had the makings of a pretty sad little computer. However, since it was originally designed as a gaming machine to compete in the video game market of the early eighties, Commodore outfitted these machines with some pretty spectacular features too. There are sixteen colors (256, if you use half-toned graphics), sprites (movable object blocks), three different character display modes, two different bit-mapped screen resolution, and a three-voice Sound Interface Device (SID) chip. All these are capabilities that you would spend thousands for on selected PC computers. Commodore sold these like hot cakes, and improved the product when it produced the Commodore 128 computer, that even today matches up well with PC's. With all of these advantages, this computer still lacked a disk operating system - DOS. Programmers can tell you what difficulties this causes. It was later installed in it's disk drives.

Then Came GEOS

GEOS was an opportunity waiting to happen. In the mid-eighties, a joint venture was formed to produce a

product for the airline industry dubbed the *Sky Tray*. The idea was to put battery powered computers on airline seating trays. Like a laptop computer, these would come with a liquid crystal display and membrane keyboard. Berkeley Softworks was to develop the operating system for the *Sky Tray*, which was based on a variant of the 6510 chip, the 6502 (the Commodore's 8-bit computer uses the 6510 processor). The idea for the *Sky Tray* was to have a *MacIntosh* like operating system - a menu driven, icon based environment for the user to interact with. An

"GEOS is an acronym for the Graphic Environment Operating System. In late 1986, Commodore dubbed it the 'official operating system for the Commodore 64'"

excellent idea, it was accepted real well by the airline industry. However, by the time the operating system was developed, the airline industry became extremely competitive, and cost cutting measures were the order of the day. Thus the extra cost of on-board computers, not to mention the added weight and the cost that that brings to the table sounded the death knell for this operating system. So Berkeley Softworks was left holding the code for an operating system that had no home.

Along Came the Commodore 64

Berkeley observed that the Commodore 64 was a 6502 based system with no real operating system on board. Here was an incredibly huge market of low end computers, whose needs for an operating system could be met with minimal translation. It was at this stage in June 1986 that GEOS was born. GEOS is an acronym for the Graphic Environment Operating System. In late 1986, Commodore dubbed it the "official operating system for the Commodore 64", and began bundling it with the computer. In general, GEOS is a full fledged operating system loaded from disk. Specifically, this thing is a wonder system!

What Does It Look Like?

What the user sees upon booting up GEOS is an application called the "desktop", which is the file manager. The desktop puts the user in the Window, Icon, Mouse, and Pointer environment. It is called a desktop because it was designed to resemble an actual desktop, complete

with desktop "pad" and desk accessories such as a notepad notemaking program, calendar, alarm clock, and an on-screen calculator to name a few. It also uses a "page flipping" routine that mimics the actual "flipping" of a page on a real life deskpad. The convenience of this is that instead of having to load a directory, you can enter various programs from the deskpad as the programs reside on these pages. The average user had/has no real appreciation for the desktop, having originally purchased the program for the two major applications supplied on the boot disk, *GeoWrite* and *GeoPaint*. Unbeknownst to them however, is that upon booting, a new kernal (think of it as an operating system's heart) is installed. The kernal, which stays memory resident, in addition to I/O and file handling is chock full of sophisticated graphics and string handling routines.

GEOS shines in its ability to integrate graphics and text MacIntosh style. This was made possible by putting GEOS on the high resolution bit-mapped screen. It has a resolution of 320 by 200 pixels using 8K to display the screen. All characters on the screen are bit-mapped as are the graphics, making it possible for a user to create a graphic in *GeoPaint* and paint it into a document written in *GeoWrite*. THIS IS POWERFUL STUFF! Additionally, and most importantly, GEOS utilizes a file format called VLIR (Vertical Length Index Record). This filetype keeps

an indexed table (a linked list) to the various records of a file. To the user, this means a data file can be created that exceed the length of available buffered memory set aside for data. GEOS creates the file, not the user as is the case with programs like *Paperclip* and other word processing programs. The user has a sense of virtual memory beyond the computer's memory through GEOS' module swapping. Sophisticated disk accessing routines take up 50% of the GEOS code. These routines are appropriately called "Disk Turbo". Disk Turbo was necessary as GEOS' bit-mapped applications are memory-starved. Here is an example of how it works. In *GeoPaint*, the user draws in a window which is roughly 1/14 the size of an 8 1/2 X 11 sheet of paper. When the user scrolls to a different location on the page, the disk drive (using the disk turbo routines) will swap out only that section of bitmap no longer visible, and load in (using the VLIR table) the appropriate data. In this manner, *GeoPaint* images over 68K in size have been created. This 68K is in addition to the kernal, the *GeoPaint* application (over 30K in size), the screen memory and fonts and utilities etc., all on a 64K computer!

Today, over 4 years after its introduction there exists a broad base of applications and programs utilizing GEOS (over 500 of them) and this section will attempt to show them, review them, and explain them in upcoming issues.

The DeskJet 500

Continued from Page 1

that this printer is printing at 300 dots per inch. The variations seem to be no more that one of those dots – usually less. But, nonetheless, the variations are there and they greatly affect the quality of the output. It is no longer possible to favorably compare the quality of the DeskJet output to that of a laser printer.

The second reason for the apparent lack of quality is just that – an apparent difference. With the original DeskJet, the printhead printed only a narrow band with each pass. The DeskJet 500 prints a band that is four times as wide. I drug out some of the old pictures that I had printed with the DeskJet and examined them closely. What close inspection revealed is that there were, indeed, small gaps between passes of the printhead. The better apparent quality is caused by the eye being unable to distinguish this imperfection on such a small scale. In other words, the entire picture was FULL of imperfections, but they were so close together that they became part of the dot pattern of the output and the eye didn't see them. Remember that this is only part of the problem. Even close inspection did not reveal any overlaps in the output of the DeskJet and the imperfections were much more evenly spread across the page.

After experimenting for several days, I began to

question whether I had a faulty printer. I have since visited the dealer three times, called the Hewlett Packard customer support line, and shown the output to a Hewlett Packard representative. The consensus is that this is normal output for this printer.

So, where does that leave us? The original DeskJet was a bargain. It produced output that was comparable to that of a laser printer at a very affordable price (when compared to a laser printer). The DeskJet 500 cannot make that claim. Still, the DeskJet 500 continues to produce output at 300 dots per inch and for anyone who works primarily in black and white, the output remains superb. And the speed is remarkable. Just be aware of the grey scale problem and make your decision accordingly.

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Amiga Library News

Public domain and shareware picks
by Bill Raecke

RoadRoute by Jim Butterfield
RoadRoute is one of those neat programs that fills a need that I didn't know I had. And if you travel a lot, you will find it even handier than I do. What it does is prepare a travel route for you between two cities. The program has 610 cities and 1542 roads built into its data base. That means that not everything is there, but it's pretty close. For example, Dallas is in the data base but Fort Worth and Arlington are not.

Here's how it works. The program can be fired up from either the WorkBench or the CLI. The program first prompts for a "City from:". That is your cue. Let's enter "Dallas". The next prompt says "From Dallas, Texas to:". This time we'll enter "Wichita Falls". The next prompt says "Dallas, Texas->Wichita Falls, Texas via (or RETURN):". So that if we want to make a side trip and build that into our route, we can do that. For now, let's just press return. The next thing we see is that the distance to be travelled is 137 miles and the calculated time of the trip (for any law-abiding citizens who may be reading this) is 2 hours and 20 minutes. At this point we have the option of pressing return for an on-screen display of the route, or "p" to dump the route to the printer. Either way, the route it calculates for this trip looks like this:

```
From: Dallas, Texas
To: Wichita Falls, Texas
 25   0:25   Dallas - Lewisville via 77
 14   0:15   Lewisville - Denton via I-35E
 23   0:25   Denton - Decatur via 380
 75   1:15   Decatur - Wichita Falls via 287
Total Miles: 137
Driving Time: 2:20
```

Now, I'm not sure that the route it calculates is always the best route. For example - Dallas to Lewisville via 77? But it certainly serves as an aid to planning. And for a quick check on the mileage between two points it is invaluable.

There are a couple of nice features built in as well. For example, if you type in a city that it doesn't recognize it will ask you for the Province or State that you are interested in. Type the state and the program brings up a list of cities for that state for you to choose from. That should get you close to where you want to be without guessing which cities might be in the data base.

At any rate, *RoadRoute* is worth taking a look at. You'll find it on MCCC-A 251.

ConMan 1.3e by William S. Hawes
ConMan is not a new product. It has been around for over three years now and many of us can't begin to comprehend what life on the Amiga would be like without it. But I realize that there are many members of this club who haven't had their Amigas for that long and who may not have heard of this product. Since 1.3e is a new release this is an opportunity to introduce it to everyone.

ConMan stands for Console Handler. The console is the CLI on the Amiga. Basically what it does is replace the NEWCON: device that has been part of the system since AmigaDOS 1.3. For a true appreciation of *ConMan* you need to go back to the days of AmigaDOS 1.2. The way the CLI worked then is that you typed in a command, and if you needed that command again or if you typed it wrong and had to make a correction, you had to start over. If we needed that kind of abuse, we'd all own MS-DOS machines. When *ConMan* was first introduced into that environment, it was like a dream come true. Now it was possible to simply use cursor keys to get back to a previous command, edit it if necessary, and press return to re-execute it. Of course, since then, AmigaDOS 1.3 has been introduced, and along with it came the Shell and the NEWCON: device giving some of the same features. But *ConMan* offers many advantages still not available in the NEWCON: device.

The thing I like best is the way position is maintained in the history. Imagine this scenario in your mind. Type a command. Now type another command. Now type a third. Now let's try to re-execute the series. We use the up cursor key to position on the first command. Then press return. The Shell and NEWCON: will re-enter that command at the bottom of the command list and will position the CLI back to the bottom. Now to execute the second command, we need to cursor back up three commands again and press return. And then once more. *ConMan* does it better. With *ConMan* when you cursor back up to the first command that you want to re-execute and press return, that command is NOT re-entered into the command list. Instead, it is re-executed in place and you are left in that same relative position. Now to execute the second command, simply press the down cursor once and then return. Once more and you're done. Much simpler. And your command list doesn't get filled with garbage either.

There are a number of other useful features as well. I won't go into all of them - I'll let you discover them for yourselves - but here is a brief list of just a few:

- The F1 key can be used to shrink the CLI to minimum size and back again without using the mouse.

- The F2 key can be used to expand the CLI to the maximum size and return it to the original size without using the mouse.
- The F5 and F6 keys are search keys. Type part of a command, press F6 and search backward for a command beginning with the string you typed. F5 searches forward.
- You can open a CLI on ANY screen.
- You can save your command history. You can even save a set of commands as a template and have them loaded as part of your startup-sequence so they'll be there whenever you start your Amiga.
- You can mount *ConMan* as the NEWCON: device so that other programs that may expect NEWCON: to be there will still function properly (such as SID).

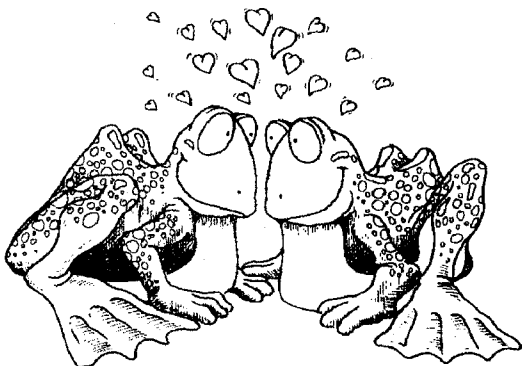
There's lots of other stuff too. If you use the CLI you need this software. It's shareware and it's on MCCC_A-252.

The Tax Survival Kit by Harv Harris
This year, for the first time, *The Tax Survival Kit* is available for the Amiga. This is a piece of software that the MCCC has been purchasing for a number of years now for our C64 and C128 members and, finally, it is available for the rest of us.

I don't think this program needs a lot of explanation. Do you pay income taxes? Yes? Then you need this program. Simple! Included are the 1040; Schedules A, B, C, D, E, F, and SE; Forms 2106, 2441, and 3903. The program is designed to print the information directly on the tax forms supplied by the government. (Some practice in getting the form lined up correctly will probably be required.)

One word of caution concerning the distribution of this program. This is a commercial product. It is licenced to the MCCC for distribution to its members. It is against the law to distribute this program to non-club members or to post it on bulletin boards. If you have a friend who is not a member but who would like a copy, take him or her a membership application and sign 'em up. A twenty dollar membership is a pretty cheap price for a program like this.

For existing members, you can get it free from the librarian on your blank disk, or you can pick up a ready-made copy for \$1. Alternately, you can buy *Tax Break* (or whatever it is called this year) for about \$80.



Shareware Rewards

by Ned Kelly

Within the last year the Amiga chapters have collected \$245 in donations to the authors of 5 different shareware packages. We have contributed to Matt Dillon, the author of many pieces of software; *Play*; *QMouse*; *SID*; and *CB*. We should be proud of the support we have given to the authors and their fine programs.

However, I would like to take this opportunity to call your attention to what we get in return for these contributions. We have almost always received an acknowledgement for our contribution and have, on several occasions, gotten a bonus. For our contribution to Matt Dillon we received 2 disks containing his latest work on UUCP software.

One of our more recent contributions was to Timm Martin, the author of *SID*. In response to this we received a letter assigning us a serial number of 1526. Because we already had the latest version of *SID*, version 1.06, he did not send it to us. However, he did confirm that he is working on *SID* version 2.00 and will send it to us upon completion. He also reported several confirmed bugs in the version we have:

1) The screen may occasionally go blank or blue and the only way to recover is to reboot. This problem can be eliminated by setting the *SID.config* flag *SeperateDirs=NO*. This bug does not affect everyone, but if it does, it can be annoying.

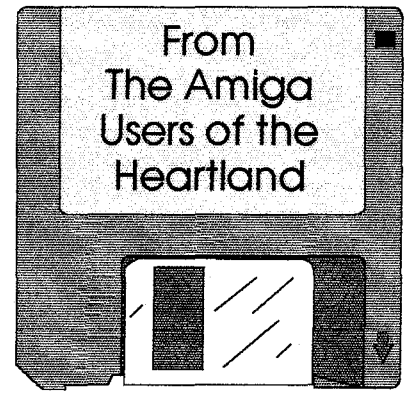
2) *SID* does not recognize LHarc files on some Amiga 2500/30's. There is a program call *ZEROFIX.LZH* which solves this problem (that apparently affects some other programs as well).

3) Also, if you cannot unarc any archived file (not just LHarc files) using *SID* v1.06, odds are that you do not have the NEWCON: device mounted, and the easiest solution is to mount the device in your startup-sequence.

It is our intention to support and encourage all the authors of public domain software because of the great benefit we get in return. Just think of how many computer viruses would be running around our systems without PD programs like *VirusX* and *KV*. So when you are at an Amiga meeting and are asked to support the current shareware offering, please be generous with your donation.

Amiga Disk Structures and Data Optimization

An Introduction by Larry Lack



Ever wonder how information is stored on our little disks? Do you use a floppy optimizer? Do you know what one is? Do you care? If you don't use one, you may want to round one or more of them up and give them a try. If you don't know what they are and why they were invented in the first place, read on. If you don't care, who cares if you don't care?

From the minute I first used one, I thought, "This is pretty neat." But it wasn't long before some new improved models came out and I got to thinkin' (it happens spontaneously on rare occasion), "I know which one I like to use, but which one actually works the best?" At the moment I have three FD optimizer programs which we'll explore a little later on in the show. But first we'll explain what happens at the disk level which necessitates an optimizer in the first place. Right after a word from our sponsor. ["We don't have a sponsor, Larry"] Would everyone please donate watching one Twin Peaks commercial for me?

First a simple analogy. Each of you has a junk drawer, don't you? Ours is in the kitchen. When we first moved in, the drawer was designated (formatted) as the junk drawer. Of course it was empty and easy to place objects in (write to) and retrieve the objects (read) from. Alas, before long our junk drawer overfloweth. What to do? Make another junk drawer? Yeah, right. Let's organize (optimize) the junk! Now we can once again place and retrieve stuff in the drawer. After awhile, alas again, it gets messy. So we reorganize. And we notice that if we never remove/replace anything from the drawer (delete/write), it stays in order. But that's not what a junk drawer is for. And that's not what a "work" disk is for.

In a real "disk" world sense, it is much more complicated. But leave it to me to simplify the facts to the point of obscurity.

First some ground rules. Any attempts at optimization should not be made on copy-protected disks or any non-standard DOS disk. Secondly, the current versions don't know how to deal with errors on either the source or destination disk.

How Disk Information Is Stored

Our 3-1/2" floppies are formatted to comprise circular cylinders numbered 0 to 79. Each cylinder has an upper and a lower track. Each track is further broken down (at the time of formatting) into 11 sectors (blocks are the same thing). Each sector has room for 512 bytes of data. So where are we? About to figure out how much information a disk is good for. [Note: Some knowledgeable people refer to tracks and cylinders as being the same thing. Some say a track is half a cylinder, i.e. just the upper/lower part. I'm not choosing sides, just stating the facts.]

80 cylinders x 22 sectors = 1760 sectors

1760 sectors x 512 bytes per sector = 901,120 bytes/disk.

But you don't get it all! About 50K is reserved for, uh, uh, well it's just reserved, OK?

Types of Blocks (Sectors, remember?)

There are five types of sectors (Blocks, remember?).

They are:

1. Root block
2. User directory
3. File header
4. File list
5. Data block

Right in the middle (cylinder 40, head 0, sector 0) is where the ROOT BLOCK is always stored. The root block is the most important block, because it contains the name of the disk, time of creation, time the disk was last written to, a hash table (or chart or list), and the bitmap pointers. The hash table is a list of entries for the root directory. The root block contains the bitmap flag (valid disk or not) and entries for bitmap "pages". This maps out the entire disk for blocks (sectors, remember?) which are free (usable) or in use. [The bitmap is cached in memory and sometimes may not get updated. When you write/delete a file, the BitMapFlag is set to invalid until it can be updated and rewritten to the disk. If the flag is "up", it indicates an invalid bitmap. The operating system then

loads and runs a program in your 1: directory called Disk-Validator. Disk-Validator hunts down all the used sectors (blocks, remember?) and creates an accurate bitmap.]

If you've noticed your Amiga being able to keep track of two disks having the same name, they don't have the same creation time. If you want to trick DOS, make sure the disks have the same name and creation time. Do this at your own risk!

The USER DIRECTORY block is similar to the root block. It is something created indirectly when you make a directory. There will be one for each directory you create.

A FILE HEADER block contains information about the file, except the file data. Here you find file name, creation time, size in bytes, protection bits, and the file comment. Also located here is a list of all the blocks for the file and a pointer to the parent directory.

The FILE LIST block is an extension of the File Header block. If the file is really large (i.e. contains more block pointers than can be fit into the File Header), there will be a pointer to a File List block as a continuation.

The DATA BLOCK is the real file information. Wow! We finally got to the meat. Here is where the actual file information is stored. But you don't get all 512 bytes (with the old file system anyway) because we need a pointer to the next Data block. Wait a minute. If there is a pointer to the next data block here, why do we need a block list in the File Header block? Just for redundancy. If the File Header block gets destroyed, this pointer can rebuild the file. It makes it pretty hard to lose a file this way (file reconstruction will be future article?).

Some other information is also stored in the data block, like block number, number of data bytes, checksum, etc. In the FFS (FastFileSystem), the entire 512 bytes is used for data by eliminating the pointers, checksum, etc. This allows for quicker access and about 5% more usable disk space.

More (undocumented) block types. There are two:

1. Boot Block
2. Bitmap Page

The BOOT BLOCK is actually two blocks, and they are always located at cylinder 0, sector 0, heads 0 and 1. This is where the "bootstrap" code is located. When you boot up your Amiga, these blocks are checked, and if they contain executable code, it is loaded and run. Normally this is for the purpose of bringing up a WorkBench or Shell environment. However, some commercial programs use special bootstrap code to bypass the normal operation of the computer. If you boot up a protected game it won't be needing many of the normal supporting files needed by you or the operating system such as printer drives and DEVS: assignments. The C: command, Install, will make a bootable disk for you by writing to the sectors all the necessary information. It will be up to you to determine what other files you need on the disk.

The other undocumented block is the BITMAP PAGE. A pointer to the BMP is contained in the root block [some systems place this in a certain location - that is fine for quick location but can be a limitation with very large storage devices if you run out of bitmap]. Sometimes the

BMP is called the File Allocation Table (FAT) or Block Availability Map (BAM). As I said earlier, the BitMap contains the list of usable (free) blocks. At least four blocks are always allocated as "in-use". The Root block, the two Boot blocks, and the BitMap block. There may be more if you format the disk with the WorkBench icons and TrashCan directory.

Where Were We?

Oh, yes. Optimization. Organization. Neatness! As you delete and write to a disk, the DOS keeps track of which sectors are free and in-use, but that isn't enough. Just because you are able to throw more stuff into the junk drawer, doesn't mean you are able to find it quickly. One important fact before we continue. Amiga disk I/O (Input/Output) is track oriented. That is, if asked to read a sector (block, remember?) from a certain track, it reads the complete track while the head is there. This can be an advantage if the position of the file is wholly located on the track. And while we're at it, if the file is large and it occupies several tracks, let's put them in some kind of order to minimize head movement. That is, if the head has to position itself over two tracks to read the complete file, let's make them tracks 335 and 36, not 1 and 73. One more time. A track has room for about 5.5K of data. If a file happens to be 5K long, let's try to put that information sequentially on ONE track since if even one sector of the track is for our file, it will read the whole track anyway. Don't make the head search all over the disk for one measly 5K file.

Basic Options

1. The files can be written in the same order as the hash chart. The Dir command follows the hash list so it will display directories faster. Also validation time is shortened.
2. a) Place File Header blocks near the Root Block. This will speed up directory reads.
b) Place Data Blocks behind Header Blocks. This will enhance the loading of large files.

That is to say, the entries in a directory should be close to each other on the disk to minimize head seeking. To optimize WB icon presentation times, the *.info file needs to follow each file header.

Something to think about for a future DOS would be a header entry indicating the last time a file was read from, not just written to. This would indicate a file the user load a lot, and therefore needs to be kept handy as possible. Then you want all the files in that directory to spread out from the directory entries such as to be as close to the "sub-directory cluster" as possible. Of course the most recently used should have least seeking to do. But we do not have an entry in the FileHeader that indicates the last time the file was read. And that's the most important item for the optimization. Best ya can do is most recently written. Of course all the blocks in a file must be contiguous in ascending block order to minimize load times.

Anyway - the bitmaps tell you nothing about the fragmentation levels on the disk. And all other things

being equal, creating new files on a fully compacted disk will be closer than one that keeps the largest open spaces spread around the disk according to most recently written directories. (That trick avoids the seeks on the new files that'd otherwise get read big with a large disk.)

That is no small project – at least to get it up to a level that would leave me fully satisfied with the cleverness of the hack.

AmigaDOS tries to place the Header block and the first Data block behind each other near the Root block. This works well enough for the loading of small files.

Trials and Tribulations

I started out to make a comparison chart using a specially prepared test disk. *FastDisk*, *DiskOpti*, *FlashDisk*, and the Copy command would be compared. On this disk I made four directories and placed a large program in the root directory. In one of the directories I copied 100 icons. Another directory was used to fill up the last bit of disk space. Then I deleted and rewrote. Over and over and over again. The disk was a mess.

Then remembering that these programs like lots of memory, I used a special startup which left me with little more than a CLI and a dir util, but some 900+K of free memory. I didn't want anything to slow down the programs or cause them memory limitations.

But alas, *FastDisk* stuttered. I can remember using it long ago and it not working on disks with lots of small files and little memory. Oh well. Then *FlashDisk* sank. And I use it all the time! Maybe 100 files in a directory was too many? *DiskOpti* worked fine enough though. Of course the Copy command worked.

Modify the test disk by limiting the Icons dir to 75 files. Still a no-go with *FastDisk* and *FlashDisk*. Limit the Icons dir to 50 files. They still won't cooperate. Then I limit it to 40 files, the same number as in my C: dir. And they still won't work! (*MCCC Editor's note: The obvious difference here is that the test is of 40 ICONS not just 40 programs.*) The total number of files was compatible or fewer than what I normally optimize on my disks. Very confusing. Each time the disk to be copied onto was formatted (with no errors). The test disk and its backup appeared to be normal in all ways. At any rate, after about 25 rounds, I got very bored sitting here with a stopwatch watching for a "finished copy". So there ain't no chart. Some conclusions that I drew were that while a plain "Copy All" was slow (10 to 11 minutes), the overall directories and loading weren't too bad. In some cases better.

While an optimizer makes a fairly quick copy (on the order of three to four minutes), they aren't smart enough to always give you what you want. What would be nice is if they asked you for specific programs and directories that you wanted to give preference to. Put them at the head of the list, so to speak. At any rate, I don't want to sound negative with regard to the optimizers. *FastDisk* was the first I had, and I used it until I got *DiskOpti*. Which I used until I got *FlashDisk*. And I like it. And it has always worked. Until now.

Hey! I can still do a chart! Of the features and options! Yeah, that's the ticket. See chart 1.

Special Features

DiskOpti by Claude Abraham will make a list of files, block numbers, and all that good DOS stuff and either save it to disk or send it to the printer for you to read on the john. *DiskOpti* has yet to ever fail for me.

FastDisk V1.5 by Torsten Stolpmann could use an update. Maybe it's already out there. Not recommended on 512K machines.

FlashDisk by Curtis Palmer has a nice intuition interface with lots of options which you can change on the fly. It will work with one drive or two and a minimum of memory. It always tells you where it is in the process with lots of messages. I use it on my work disks with a history of no problems.

There are commercial optimizers such as *BAD* (Blitz Amiga Disk) and *Tune-Up* which will also work with hard drives. I'm not aware of any PD programs that work with hard drives, but it may be worth your effort to look.

Some tools you will find useful are *DiskView* and *DiskX*. *DiskView* by Claude Abraham shows you the scattering of files on a floppy.

One last note on optimizing a disk. Since the normal DOS writes things in the order specified, you may use a dir util and selectively copy root files and directories (and the files contained therein) in the order you want. Be creating a directory and then copying ALL the files into it, it places all the data close to each other. This will put files "at the head of the list", so to speak. It will write files from the center of the disk outward (most of the file requestors alphabetize, not the DOS). Since the first files written are the quickest files to read, you may use it to your advantage. Of course this will be very slow and less than automatic. As soon as you change your mind and delete or write new files to the directory, the physical order on the disk can change drastically. And needless to say, the movement of the head will increase, causing slow reads/writes.

MCCC Editor's note: This article still leaves one unanswered question: "What is the best way to optimize a disk?" In the July, 1989 issue of the MCCC News, a test was run comparing the AmigaDOS Copy command, FastDisk, and DiskOpti. The results showed AmigaDOS to be the clear winner in building directory structures that could be quickly scanned. (Dir commands were about twice as fast.) FastDisk and DiskOpti are much better than AmigaDOS in building disk structures that can load programs quickly. (AmigaDOS is about 1/3 slower.) And FastDisk is the clear winner when it comes to building a disk structure that will display icons quickly. (AmigaDOS takes twice as long and DiskOpti takes three times as long.)

Chart 1

Program	FastDisk	DiskOpti	FlashDisk
Size	13K	9K	22K
Formats Automatically	Yes	No	Yes
Verify Option	No	No	Yes
Drives Required	2	2	1 or 2
Interface	CLI	WB (min)	WB (nice)

SuperDisks

Library Information
by Harold Williams

This month's SuperDisk article will cover the utilities on the SD-PicUtil and SD-PicUtil2 disks. These two disks are packed with programs that allow you to view pictures, capture pictures and convert picture file formats. There are also several pictures included on each disk.

Showing Pictures - There are eight utilities on these disks that allow you to display pictures that are in the Amiga IFF format. Some of these utilities include the ability to create very sophisticated slide show type presentations.

Dyna-Show will display the Dynamic HiRes and Dynamic HAM modes available with *Digi-View 4.0* software from NewTek. *Dyna-Show* will also display pictures in the normal IFF formats. *Mostra* (abbreviated "M") is a more versatile picture viewer. *Mostra* can display all normal IFF pictures, SHAM pictures (a special IFF format created by Amiga Resource) and will automatically call *Dyna-Show* if it encounters a Dynamic HiRes picture. *Mostra* has many options like centering, fading, and hiding the mouse pointer. Pictures that are larger than the screen can be scrolled using the cursor keys. *Mostra* is currently the most powerful of the simple picture viewing programs. Both *Dyna-Show* and *Mostra* are on SD-PicUtil2.

SD-PicUtil contains six view/slide show programs. *ShowIFF* will display normal IFF pictures, along with most SHAM and Dynamic-HiRes pictures. *SuperView* has long been the standard by which picture viewing utilities have been measured. *SuperView* does not display SHAM or Dynamic-HiRes, but it will provide a limited view of animations that are in the Anim-5 format. *SuperView* offers many options for controlling its display. *SuperSHAM* and *SVSham* are utilities specifically

designed to display pictures in the SHAM format. *ShoWiz* and *XIP* are display utilities that are designed to create slide-show presentations. *ShoWiz* offers a large variety of "wipes" to create interesting transitions from one picture to the next. *ShoWiz* has a very complete scripting language. *ShoWiz* scripts can display pictures intermixed with text and sounds. *XIP* will also create slide show presentations using a script. *XIP* offers a huge number of options for creating transitions from one picture to the next.

Capturing Pictures - *HERMiT* is a screen capture utility that is included on SD-PicUtil. *HERMiT* can usually capture a screen that is being displayed. When *HERMiT* is run a requester appears to specify the path for saving the picture files. *HERMiT* then runs in the background waiting for a special combination of keys (ctrl/alt/s) to be pressed. When the keys are pressed *HERMiT* saves the picture that is currently being displayed. *HERMiT* can also be run with a time delay so that pressing the special keys is not required. *3rdDay* is a very different type of screen capture utility. It is included on SD-PicUtil2. *3rdDay* does not capture screens as they are displayed but instead tries to find the picture data that is left in RAM. This technique will sometimes even find pictures after a re-boot!

Converting Pictures - Both picture utility disks include several programs for converting pictures from the GIF file format to the IFF file format. The GIF format is commonly used by MS-DOS machines. Converting these pictures to the normal Amiga file format will allow them to be displayed and manipulated on the Amiga. The conversion programs on the SuperDisks will convert GIF pictures to grey scale, HAM, and SHAM. There is also a utility for converting IFF to GIF.

These disks include a collection of about a dozen outstanding pictures including examples of all of the different file formats that are used by the various utilities. The SuperDisks always include complete documentation for the utilities on the disks.

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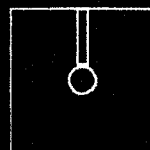
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GEOS News

by Foster McCowen

In December 1990 at the regular meeting for the Arlington/Grand Prairie chapter, it was discovered that very few members used GEOS programs, or for that matter, even knew what GEOS was. Prompted by an earlier desire to increase tutorials at the monthly meetings, president Glen Herring announced that the February 1990 meeting, held on 2/12/91 would be a special GEOS meeting. Everything you always wanted to know about GEOS but didn't know who to ask will be covered at this meeting. So please accept our personal invitation and attend!

Good News

Angie McKenna with the customer service department (415-644-0926) at Berkeley Softworks told me that Berkeley was planning to new product introductions this year. She wouldn't say what, but she alluded that one of them may be an upgrade to the operating system. This is something to look forward to, especially considering their stalwart reputation with upgrades and new products. Of note is last year's *GeoRam* and the previous year's introductions of *GeoChart* and the 2.0 version of the operating system.

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Amiga Central David Campbell

At the January meeting, Scott Lamb reported on his trip to CES in Las Vegas. The most exciting news was the imminent release of CDTV. This system will make our beloved Amiga available to people that previously had not even considered buying a computer. By cleverly disguising an Amiga 500 as a smart CD player, Commodore is hoping to capture the home consumer audio market. Scott (who has been busy developing his *Classic Board Games* for CDTV) says the system will be introduced in California in February. We should begin to see it here some time in March and it should be everywhere by April.

Also at the meeting, Ray Howard demonstrated several games. Included were the commercial games *Wings* and *Oshido* and the shareware *SpaceWar*. Speaking of shareware, our contribution jar this month was devoted to *Snap*, a useful little program that allows the clipping of text or graphics from any screen.

Amiga North Dallas Genny White

Our January meeting was more than a little overshadowed by the outbreak of

that night, but as George Bush says, life goes on... so we met, a little smaller group and a little tenser than usual, but

still glad we came to share our Amiga interests and comraderie on a memorable night. Nybbles of news: we heard a little about the administrative shakeup at Commodore (VERY little); heard that CDTV was a tremendous hit at a recent show; were introduced to the FREE tax-form-handling program available from our library; heard that Amiga User International had a picture of the 3500 on its cover; discussed briefly the PD utilities *MyMenu* and *HandyIcons*; were told about the Amiga UX at the super-collider plant; heard a bit about the PCVCR device from NEC (single frames to tape!); were reminded about UniForum and a Videographics seminar (both in January); snickered at news of NEWTEK showing Amigas at MacWorld; heard of an article in Computer Graphics World about the A3000; AND were told about the PD Pick of the Month, *Snap*. *Snap* is a utility that lets you cut and paste text and even graphics from one window to another. Handy to use, says Danny White, and "runs very solidly"... (and believe me, if anybody can make something crash, HE can). We collect contributions for the authors of these fine PD and Shareware products monthly, in a labeled jar at the meeting. When you're stuffing your name in the Door Prize jar next to it, why don't you remember to show your appreciation of any software you find worthy?

After all this rapid-fire info-swapping, we paused to somberly listen to the President's address at 8 p.m. When he had finished, the TV once again became a monitor and we once again became fun-loving Amigaphiles, and Danny Barnett became our demo-of-the-month-presenter. His topic was Public Domain telecommunications software, and via the Access! communications package we visited several BBSs. Danny introduced us to The Unknown BBS, where he and others swap silliness and serious conversation about sci-fi, fantasy,

computers, and whatever. Run by the mysterious Maintenance Man III, Unknown may be accessed at (214)487-6710 (1200 Baud) and welcomes new members. We visited our own MCCC BBS and learned how to download a file from the club BBS library. The one we picked (just a small file to test with) turned out to be a scream... upon execution a little rocket chases the mouse pointer around the screen like a mini-Patriot until at last you zig and it zags and a tiny little explosion lights up the screen. Hee, hee! Then on to the popular GENIE BBS, and a guided tour of its features. Thanks to all who shared their user accounts and knowledge with Danny and the rest of us! I know I personally feel less intimidated by the concept of diving into a BBS, seeing how they have much in common and much to offer, and are really very user-friendly!

Secretarial note: turn this over and look at your mailing label. When does your membership expire? Read the fine print in the newsletter to see how to renew if your time has come! (If you are reading somebody ELSE's newsletter, the same fine print tells you how to get one of your own, hint, hint!)

Last but not least were a slew of goodies from the Door Prize collection: why were there *2* sets of tennis balls from Amazing? I think I've encountered a running gag that began before my time. Amazing ALSO contributed *Night Breed* and *Arcade Fever*, and from Metropolitan came *Sonix Soundtracks Vol 1* and *TV Text*. Thanks, most generous Goodie Gifters!

Next month: Come and see on 2/20! Same time, same place. Happy Valentines Day!

Amiga West Ben Clingerman

IT'S OFFICIAL!!! A NEW AMIGA CHAPTER! Amiga West meetings are held on the second thursday of each month at the Ridgemar Manor Apartments located at 2200 Taxco in the clubroom over the office (for now). We would like to thank Dave Johnson of Amazing

Computers and the Ridgeman Manor management for making possible the use of the clubroom.

We started the meeting tonight by electing chapter officers. Officers are:

Jack Smith	President
John Belyeu	Vice-President
Fred Sagor	Librarian
Wayne Brodnax	Treasurer
Ben Clingerman	Secretary

Jack Smith opened the meeting greeting new members, old members and visitors who were in attendance, after which he opened a question and answer session as to everyone's preferences on future meetings or topics they might wish to discuss. Jody Reimers informed us that he discovered *Deluxe Paint III* is now version 3.25 and that it supports 736x482 maximum overscan at high-res. Jack Smith, with help from Jody Reimers, demoed the shareware program of the month: *Snap*.

Our feature presentation: a walk-through of the ray-tracing program *Imagine* was given by Jody Reimers. Jody ran several ray-trace animations that he created for the Dallas Mavericks. He then made comparison's with other ray-trace programs. Time lengths, shaded rendering and light sources were covered. Jody then rendered a

24 Bit sphere for us. VERY NICE! Jody also discussed as he rendered staggered and non-staggered points of a sphere. Much was

learned about ray-tracing and of the fabulous program *Imagine*.

Jody asked me to let everyone know that

his Multi-Media BBS is almost ready to roll. ALL RAY-TRACE PROGRAMS WILL BE SUPPORTED!!! The BBS will feature: PD objects, logos, attributes and sound effects. Jody needs ray-trace objects from you, the Amiga public, to create a collection for a future Fred Fish disk for all the world to see. ALL OBJECTS MUST BE PUBLIC DOMAIN or something you yourself have created.

Come by and see AMIGA WEST - the NEWEST MCCC CHAPTER IN THE METROPLEX. We are looking for Amazing Things from Amiga West.

Fort Worth Ellen Triplett

Our December meeting was delayed one week to make way for the Christmas party and we were unable to make the newsletter deadline last month, so I will give a brief run down on that meeting as well as our January meeting.

We held our election for chapter officers with the following results:

President	John Sookma
& Vice President	Julia Sookma
Treasurer	Ellen Triplett
Secretary	James Dunnam
Librarian	

John Sookma reported on COMDEX 90 in Las Vegas, which he had attended on its last day, visiting the Commodore area. He said it was mostly Amiga. He also stopped by Dolon Springs, Arizona, and visited with Rich Meyer, former president of the Ft. Worth chapter.

Santa (aka Bill Aiken) dropped in and distributed free Screen Cleen samples from Compute Magazine to those present. Refreshments were served.

This month rather than a formal program, we had a round table discussion on how we use our computers.

Some of us (who shall be unnamed) have a

slight problem remembering the keys used to control various programs and really need a cheatsheet to keep from having to constantly refer to the manual. If anybody knows of a program in the library or in public domain that prints such and overlay, I would appreciate knowing about it. Also, I understand there is Gary's label making program (with graphics) in our library - which I would love to have - but no one seems to remember the number of the disk. Call me if you know. Thanks.

At our February meeting, Kenneth Blanning will bring a presentation on *CAD and Paint* for the 128 or 64 with expansion. As always, visitors are welcome. This month 2 of our visitors liked what they saw well enough to join our club. Evidently 64/128 users are alive and well in this area. We just have to find them and let them know we are here for them.

H.E.B.
Robyn Wilson

At the December meeting the *1990 Tax Survival Kit* was introduced by Okley Moss. This program is only for members of MCCC. You must exchange or buy a disk for \$1 in order to get the program. It is a plain text program that calculates your taxes for the year. It has all the updated schedules and can either be viewed on the screen or on a printer.

The library is back and is getting better! Bill Worthington is going to bring the library to the meetings and maintain the majority of it. Also, Mick McCormick, a new member of MCCC, has taken on the task of building up a special C64 and C128 game disk library.

The January meeting and most future meetings will include a question and answer session for any problems you may have with your computer system or software.

The meeting date is changing to the first Saturday of the month. The meeting place will be at the Hurst Recreation Center on Mary Drive on March 2nd at 1:30 pm. See you there!

The Fine Print

The Metroplex Commodore Computer Club

Statement of Purpose

The Metroplex Commodore Computer Club is a not-for-profit organization devoted to the collection and dissemination of computer knowledge, to the encouragement of computer education, and to the use of Commodore computers in the home, at school, and in business.

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Our meetings are open to all. Family membership dues are \$20 per year or \$12 for six months, and entitle the member to a monthly mailed copy of the MCCC News, free access to the club's extensive public domain and shareware software library, and discounts at many area merchants. An additional \$12 annual fee provides access to the MCCC multi-user Bulletin Board System.

The MCCC News

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Articles

Members are encouraged to submit articles. Articles should be submitted as ASCII text. They may be uploaded to the MCCC BBS, to StarText, or on disk. If these methods are not possible, I will, as a last resort, accept printed articles. If graphics need to be included they may be submitted as Amiga IFF files, PageStream structured drawings, or, again as a last resort, printed output.

Deadline

The deadline for submissions to the MCCC News is the Monday following the third Saturday of each month. Payment must accompany all ad copy. Make checks payable to MCCC and mail to P.O. Box 813, Bedford, Texas 76095.

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Extra Copies of the MCCC News may be obtained for \$1 per copy. Orders should be forwarded to the club along with the required fee. Orders must be received by the regular newsletter deadline.

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Normal Meeting Schedule

1st Saturday	MCCC Board of Directors
1st Saturday	HEB Chapter
1st Saturday	Programmer SIG
2nd Tuesday	Amiga By-The-Loop Chapter
2nd Tuesday	Arlington/Grand Prairie Chapter
2nd Thursday	Amiga West Chapter
2nd Saturday	Fort Worth Chapter
2nd Saturday	Arlington/Grand Prairie Workshop
3rd Wednesday	Amiga North Dallas Chapter
3rd Thursday	Amiga Central Chapter
3rd Saturday	Programmer SIG

CALENDAR OF EVENTS

- | | | | |
|----------|--|--------|--|
| Feb 2,16 | Programmer SIG
1:00 pm
4843 Keller Springs Road, Dallas
Kevin Wambgan, 214-221-8652 | Feb 14 | Amiga West Chapter
7:30 pm - Ridgmar Manor Clubroom
2200 Taxco, Fort Worth
Jack Smith, 817-924-9289 |
| Feb 9 | Fort Worth Chapter
1:30 pm - West Berry Church of Christ
2701 West Berry, Fort Worth
John Sookma, 817-293-8691 | Feb 20 | Amiga North Dallas Chapter
7:30 pm - Richardson Civic Center
411 West Arapaho, Richardson
Craig Bird, 817-540-3360 |
| Feb 9 | Arlington/Grand Prairie Workshop
1:30 pm - Grand Prairie Library
Grand Prairie
Jerry Hiatt, 817-649-1358 | Feb 21 | Amiga Central Chapter
7:30 pm - Arlington Community Center
2800 S. Center, Arlington
Ray Howard, 214-660-4819 |
| Feb 12 | Amiga By-The-Loop Chapter
7:30 pm - N.Richland Hills Community Center
Loop 820 at Rufe Snow, N.Richland Hills
David Owens, 817-577-2304 | Mar 2 | MCCC Board of Directors
10:00 am - N.Richland Hills Community Center
Loop 820 at Rufe Snow, N.Richland Hills
Craig Bird, 817-540-3360 |
| Feb 12 | Arlington/Grand Prairie Chapter
7:00 pm - Stoneridge Homeowners Assn. Clbhs.
500 Grants Parkway, Arlington
Glen Herring, 817-572-0489 | Mar 2 | Hurst-Euless-Bedford Chapter
1:30 pm - Hurst Recreation Center
Mary Drive South of Pipeline, Hurst
Jesse Carden, 214-890-0426 |

March Newsletter Deadline - February 18

MCCC NEWS

Metroplex Commodore Computer Club
P.O. Box 813
Bedford, Texas 76095

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